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Freiling et al.

[54] **RULE ACQUISITION FOR EXPERT SYSTEMS**

[75] Inventors: **Michael J. Freiling**, Portland; **James H. Alexander**, Beaverton; **Brian Phillips**, Aloha; **Steven L. Messick**, Portland, all of Oreg.

[73] Assignee: **Tektronix, Inc.**, Beaverton, Oreg.

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[56] **References Cited**

U.S. PATENT DOCUMENTS

4,286,330	8/1981	Isaacson	364/900
4,479,241	10/1984	Buckley	382/15
4,591,983	5/1986	Bennett et al.	364/403
4,593,367	6/1986	Slack et al.	364/513
4,595,982	6/1986	Burt	364/300
4,599,691	7/1986	Sakai et al.	364/419
4,599,692	7/1986	Tan et al.	364/513
4,599,693	7/1986	Denenberg	364/513
4,635,199	1/1987	Muraki	364/419
4,638,445	1/1987	Mattaboni	364/513
4,648,044	3/1987	Hardy et al.	364/513
4,658,370	4/1987	Erman et al.	364/513
4,675,829	6/1987	Clemenson	364/513
4,688,195	8/1987	Thompson et al.	364/300
4,697,242	9/1987	Holland et al.	364/513

OTHER PUBLICATIONS

Miller, J. C. et al., "An Adaptive Speech Recognition System Operating in a Remote Time–Shared Computer Environment", IEEE Transactions on Audio and Electroacoustics, vol. AU–18, No. 1, Mar. 1970, pp. 26–31.
Rich, Elaine, Natural–Language Interfaces, Computer, Sep. 1984, pp. 39–47.
Hayes–Roth, Frederick, The Knowledge-Based Expert System: A Tutorial, Computer, Sep. 1984, pp. 11–28.
Avron Barr and Edward A. Feigenbaum, The Handbook of Artifical Intelligence, 1982, vol. II and III.
Hayes–Roth, Frederick; Knowledge Based Expert Systems, *Computer*, Oct. 1984, pp. 263–273.

Primary Examiner—Gareth D. Shaw
Assistant Examiner—Kevin A. Kriess
Attorney, Agent, or Firm—John P. Dellett; Robert S. Hulse

[57] **ABSTRACT**

A rule acquisition method for expert systems receives input from the expert, one word at a time, and checks each word by determining alternative parses for the partial sentence as so far entered. Feedback is provided to the expert when a word does not conform to a required grammar, this feedback comprising a menu of legal next choices. When the sentence is completed it is translated into the form of a diagnositc rule. An expert system for troubleshooting electronic equipment is disclosed employing rules generated in the aforementioned manner.

14 Claims, 8 Drawing Sheets